IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

CIF LICENSING, LLC, d/b/a GE LICENSING,	)	
Plaintiff,	)	
v.	)	C.A. No. 07-170-JJF
AGERE SYSTEMS INC.,	)	
Defendant.	)	

DEFENDANT AGERE SYSTEM INC.'S OPENING CLAIM CONSTRUCTION BRIEF

YOUNG CONAWAY STARGATT & TAYLOR LLP
Josy W. Ingersoll (No. 1088)
jingersoll@ycst.com
John W. Shaw (No. 3362)
jshaw@ycst.com
Jeffrey T. Castellano (No. 4837)
jcastellano@ycst.com
The Brandywine Building
1000 West Street, 17th Floor
Wilmington, DE 19899-0391
302-571-6600

-and-

TOWNSEND AND TOWNSEND AND CREW LLP
David E. Sipiora
Ian L. Saffer
Chad E. King
1200 Seventeenth Street, Suite 2700
Denver, Colorado 80202-5827
303-571-4000

Attorneys for Defendant Agere Systems Inc.

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NATURE AND STAGE OF PROCEEDINGS

This is an action for patent infringement brought by CIF Licensing LLC, d/b/a GE Licensing, against Agere Systems Inc. (together "the Parties") for alleged infringement of U.S. Patent Nos. 5,048,054, 5,428,641, 5,446,758, and 6,198,776. Pursuant to Paragraph 7 of the Court's Rule 16 Scheduling Order (D.I. 32), on March 14, 2008 the Parties exchanged claim terms to be construed by the Court, and on March 28, 2008 the Parties exchanged their respective proposed constructions. The Parties have met and conferred multiple times to resolve claim construction issues, and have stipulated to the meaning of several terms, as shown in Exhibit A of the Parties' Final Joint Claim Construction Chart as filed by the Plaintiff. The remaining contested terms are set forth in Exhibit B of the Parties' Final Joint Claim Construction Chart. The Parties filed a stipulated motion to extend the time to provide opening claim construction brief to April 28, 2008. (D.I. 84) The claim construction hearing for this matter is set for June 11, 2008 at 10:00 AM.

Pursuant to the Court's Order of September 19, 2007, Defendant Agere Systems Inc. ("Agere") submits this Opening Claim Construction Brief Regarding U.S. Patent Nos. 5,048,054, 5,446,758, 5,428,641, and 6,198,776 (collectively, the "Patents-in-Suit").

I. INTRODUCTION

Plaintiff CIF Licensing, LLC, d/b/a GE Licensing ("GE") has accused Agere of infringing Claims 1, 12, and 46 of U.S. Patent No. 5,048,054 ("'054 Patent"); Claims 1, 26, and 36, and of U.S. Patent No. 5,446,758 ("'758 Patent");[1] Claims 1, 3, 5, and 7 of U.S. Patent No. 5,428,641 ("'641 Patent"); and Claims 1, 9, and 30 of U.S. Patent No. 6,198,776 ("'776 Patent").[2]

All of these patents cover technology used in analog modems. The '054 Patent discloses a technique for evaluating the conditions of an analog telephone line to determine the best modem parameters for data transmission. The '641 Patent discloses a method for sending data so the data transmission rate can be incrementally adjusted to the highest possible rate the line conditions will allow. The '776 Patent discloses a technique that aids in enabling high rates of "upstream transmission," which is transmission of data from an end user's computer to the telephone company's central office.

All four of the Patents-in-Suit are highly technical and use a vernacular unique to the art of signal processing and modem technology. This vernacular involve terms that have very different meanings outside of the modem field. Accordingly, the claim construction process is of

[1] The parties do not dispute the construction of any claim terms in the '758 Patent. Hence, this Brief does not address the '758 Patent except by way of background.

[2] For the Court's convenience, each of the asserted claims of the patents at issue is reprinted in Exhibit A hereto.

utmost importance in understanding the meaning of the claims of these patents and the relationship between each invention and the prior art.

The parties have identified a total of sixteen (16) disputed claims terms that require the Court's attention. One of the claims terms is indefinite within the meaning of 35 U.S.C. § 112, ¶ 2, and not enabled under 35 U.S.C. § 112, ¶ 1; accordingly, Agere will be moving for summary judgment in due course, based on the defects in that term. With respect to the remaining fifteen claim terms, Agere offers the following support for its proposed claim constructions. Agere has based its constructions entirely on intrinsic evidence and respectfully submits that neither expert testimony nor any other form of extrinsic evidence is necessary to define the meaning of these disputed claim terms.

II. CLAIM CONSTRUCTION LAW

The ultimate goal in construing the claims of a patent is to determine what the patentee claims to have invented. The second paragraph of section 112 of the Patent Act, 35 U.S.C. § 112, states that the specification of a patent "shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." The Federal Circuit has stated that "[i]t is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'"[3] As such, it is often necessary for the Court to construe or interpret certain words used in a patent's claims in order to determine properly what has been invented and "claimed" in the patent.

[3] *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc), *quoting Innova/Pure Water, Inc. v. Safari Water Filtration Systems, Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004).

In pursing this objective, the Federal Circuit has made clear that the use of intrinsic evidence is to be favored to the virtual exclusion of extrinsic evidence. Specifically, in *Phillips* (en banc), the Federal Circuit dismissed the *Texas Digital* methodology, which relied heavily on dictionary definitions in the claim construction process and, instead, reaffirmed the methodologies of *Vitronics, Markman*, and *Innova* which emphasize the primacy of intrinsic evidence.[4] Intrinsic evidence includes the language of the claims themselves, the patent's specification and figures, and the patent's prosecution history, if in evidence.[5] Hence, absent countervailing considerations, claim construction is a task of evaluating the relevant intrinsic evidence to arrive at the proper meaning of the asserted claims.

A. Ordinary meanings of claim terms are usually controlling.

The Federal Circuit has stated repeatedly that the words of a claim are to be given "their ordinary and customary meaning."[6] The ordinary and customary meaning of a claim term is the meaning that would be given to the term by a "person of ordinary skill in the art" at the time of the invention (*i.e.* the effective filing date of the patent application).[7] "Properly viewed, the 'ordinary meaning' of a claim term is its meaning to the ordinary artisan after reading the entire patent."[8]

In some instances, the ordinary and customary meaning of a disputed claim term is "readily apparent even to lay judges, and claim construction in such cases involves little more

[4] *Id.* at 1324.
[5] *See generally Phillips*, 415 F.3d 1303.
[6] *Virtronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996); *see also Toro Co. v. White Consol. Indus., Inc.*, 199 F.3d 1295, 1299 (Fed. Cir. 1999).
[7] *Phillips*, 415 F.3d at 1313; *Home Diagnostics, Inc. v. LifeScan, Inc.*, 381 F.3d 1352, 1358 (Fed. Cir. 2004).
[8] *Phillips*, 415 F.3d at 1321.

than the application of the widely accepted meaning of commonly understood words."[9] At other times, the meaning of a disputed term may not be readily understood even by persons of ordinary skill in the art. In such cases, "the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification."[10] It is in this context that intrinsic evidence is most important to the claim construction process. The risk of error or misunderstanding "is greatly reduced if the court instead focuses at the onset on how the patentee used the claim term in the claims, specification, and prosecution history, rather than starting with a broad [dictionary] definition and whittling it down."[11] The Federal Circuit does not suggest a particular order for the court to use when consulting the various sources of information about claim terms, but instead suggests that "what matters is for the court to attach the appropriate weight to be assigned to those sources in light of the statutes and policies that inform patent law."[12]

B. Guidance from the claims.

In addition to defining the invention, the claims themselves can be instructive as to the meaning of disputed claim terms: "[t]he context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of those terms."[13] Often, the context in which a word is used can add meaning to the term.[14] For example, in *Phillips*, the

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[9] *Id.* at 1314.
[10] *Id.* at 1313, *citing Multiform Desiccants, Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1477 (Fed. Cir. 1998).
[11] *Phillips*, 415 F.3d at 1321.
[12] *Id.* at 1324, *citing Vitronics*, 90 F.3d at 1582.
[13] *ACTV, Inc. v. Walt Disney Co.*, 346 F.3d 1082, 1088 (Fed. Cir. 2003).
[14] *Phillips*, 415 F.3d at 1314.

Federal Circuit found that claim language referring to "steel baffles" implied that "baffles" were not inherently objects made of steel.[15] Moreover, because claim terms are normally used consistently throughout a patent, language of other claim terms, both asserted and unasserted, can lend meaning to a disputed claim term.[16] Likewise, differences among claims can also be instructive as to claim term meaning where, for example, additional limitations not found in an independent claim are present in a dependent claim.[17]

C. Specification.

In *Phillips*, the Federal Circuit reemphasized the importance of a patent's specification in construing disputed claim terms. The specification provides the context particular to the "ordinary" meaning of a claim term as used in a patent.[18] As dictated by 35 U.S.C. § 112, the claims appear at the end of the specification and form part of "a fully integrated written instrument."[19] Thus, the claims "must be read in view of the specification, of which they are a part."[20] The specification is of particular importance where the patentee, acting as a lexicographer, gives meaning to a term that differs from the meaning it would ordinarily possess.[21] Equally important is when, in the specification, the patentee disavows a particular

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[15] *Id.*; *see also Mars, Inc. v. H.J. Heinz Co.*, 377 F.3d 1369, 1374 (Fed. Cir. 2004) (claim term "ingredients" construed in light of the use of the term "mixture" in the same claim phrase); *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1356 (Fed. Cir. 1999) (claim term "discharge rate" construed in light of the use of the same term in another limitation of the same claim).

[16] *Vitronics*, 90 F.3d at 1582.

[17] *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1538 (Fed. Cir. 1991); *see also Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 910 (Fed. Cir. 2004).

[18] *Phillips*, 415 F.3d at 1321.

[19] *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 978 (Fed. Cir. 1995) (en banc), aff'd 517 U.S. 370 (1996).

[20] *Id.* at 979.

[21] *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002).

meaning or definition.[22] Moreover, even when the specification does not expressly define a term it "acts as a dictionary . . . when it defines terms by implication."[23] Thus, the court in *Phillips* stated, "[i]t is therefore entirely appropriate for a court, when conducting claim construction, to rely heavily on the written description for guidance as to the meaning of the claims."[24] Indeed, according to the Federal Circuit, the specification is "*the single best guide to the meaning of a disputed term*."[25] (emphasis added)

D. Prosecution History.

In construing disputed claim terms, a Court "should also consider the patent's prosecution history" when that prosecution history is in evidence.[26] "[A]n invention is construed not only in the light of the claims, but also with reference to the file wrapper or prosecution history in the Patent Office."[27] The prosecution history consists of the complete record of the proceedings before the PTO, including all prior art cited during the examination of the patent application.[28] The prosecution history is particularly valuable because it "was created by the patentee in attempting to explain and obtain the patent."[29] As such, it is evidence of how not

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22 *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1343-44 (Fed. Cir. 2001).

23 *Vitronics*, 90 F.3d at 1582; see also *Irdeto Access, Inc. v. Echostar Satellite Corp.*, 383 F.3d 1295, 1300 (Fed. Cir. 2004) ("Even when guidance is not provided in explicit definitional format, 'the specification may define claim terms 'by implication' such that the meaning may be found in or ascertained by a reading of the patent documents.'") (citations omitted); *Bell Atl. Network Servs., Inc. v. Covad Communications Group, Inc.*, 262 F.3d 1258, 1268 (Fed. Cir. 2001) ("[A] claim term may be clearly redefined without an explicit statement of redefinition.")

24 *Phillips*, 415 F.3d at 1317.

25 *Phillips*, 415 F.3d at 1315, *citing Vitronics*, 90 F.3d at 1582.

26 *Markman*, 52 F.3d at 980.

27 *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 33 (1966).

28 *Autogiro Co. of America v. United States*, 384 F.2d 391, 399 (Ct. Cl. 1967).

29 *Phillips*, 415 F.3d at 1317.

only the patentee but also the PTO understood the patent and the invention disclosed therein.[30] However, because the prosecution history represents "an ongoing negotiation" between the patentee and the PTO, it sometimes lacks the clarity of the specification and "thus is less useful for claim construction purposes" than the specification.[31]

E. Extrinsic Evidence.

In *Phillips*, the Federal Circuit substantially diminished the role of extrinsic evidence in claim construction. The Court essentially rejected the methodology followed in *Texas Digital* holding that "the methodology it adopted placed too much reliance on extrinsic sources such as dictionaries, treatises, and encyclopedias and too little on intrinsic sources, in particular the specification and prosecution history."[32] Thus, while extrinsic evidence may be useful in certain circumstances during the claim construction process, it is "less significant than the intrinsic record in determining 'the legally operative meaning of disputed claim language.'"[33] "In sum, extrinsic evidence may be useful to the court, but it is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence."[34]

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[30] *Id.*

[31] *Id., see also Inverness Med. Switz. GmbH v. Warner Lambert Co.*, 309 F.3d 1373, 1380-82 (Fed. Cir. 2002) (the ambiguity of the prosecution history made it less relevant to claim construction.)

[32] *Id.* at 1320.

[33] *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 862 (Fed. Cir. 2004), *quoting Vanderlande Indus. Nederland BV v. Int'l Trade Comm'n*, 366 F.3d 1311, 1318 (Fed. Cir. 2004).

[34] *Phillips*, 415 F.3d at 1319.

III. THE INTRINSIC EVIDENCE RELEVANT TO INTERPRETATION OF THE '054 PATENT

A. The patent application underlying the '054 Patent.

The '054 Patent issued on September 10, 1991 from U.S. Patent Application No. 07/351,199 (the "'199 Application"), which named Vedat Eyoboglu and Ping Dong as inventors and was filed May 12, 1989. The '054 Patent does not claim priority from any earlier-filed applications.

B. The Specification of the '054 Patent.

The '054 Patent is entitled "Line Probing Modem," and it contains three figures and twenty-two columns of text, including seventy-one claims. The specification of the '054 Patent generally discloses a modem that "includes a receiver for receiving [a] modulated signal [from a remote device] and for receiving a line probing signal sent by the remote device over the channel,"[35] as well as a "line probing processor for measuring characteristics of the channel based upon the received line probing signal."[36] Based upon these measurements, the modem disclosed by the '054 Patent "determines the best transmission band and maximum bit rate for the modem based upon an offline measurement of the characteristics of the particular channel to which the modem is connected."[37]

[35] '054 Patent, col. 1, ll. 64-66.

[36] *Id.*, col. 1, l. 68 – c. 2, l. 2.

[37] *Id.*, col. 3, ll. 56-59.

The specification (excluding the claims) is divided into three basic sections: a "background of the invention" section, "a summary of the invention" section, and a "description of the preferred embodiment" section.

In the background section, the patentee describes prior art modems, noting that "in most commercial high-speed voiceband modems today, the baud rate and carrier frequency and thus the transmission band is often fixed . . . . [S]ince channel characteristics show considerable variation between different lines or connections, with such modems it is difficult to achieve the best possible performance on all possible lines."[38]

The "summary of the invention" section is of little benefit in understanding the claims of the '054 Patent. That section essentially restates the claims themselves without providing any further elaboration.

Hence, it is the "description of the preferred embodiment" section to which the reader must turn for an understanding of the claims. Essentially, this section describes the three figures of the patent. Figure 1 of the '054 Patent is the only figure that purports to show a structural view of the modem disclosed by the '054 Patent, and a review of that figure is instructive.

[38] *Id.*, col. 1, ll. 49-57.

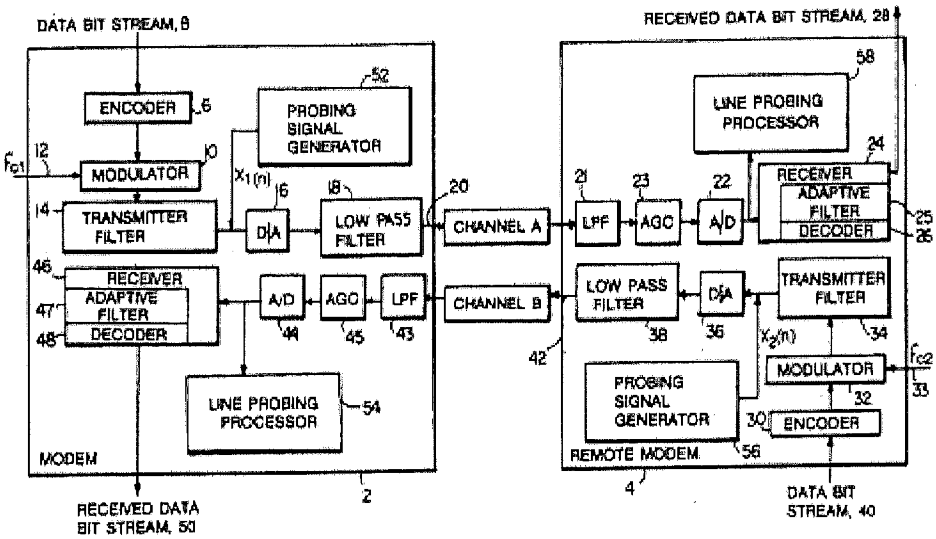

Figure 1 – U.S. Patent No. 5,048,054

Figure 1 illustrates a communication system employing a local modem (2) and a remote modem (4). The remote modem (4) receives a signal over Channel A from the local modem (2).[39] "[T]he received signal passes though a lowpass filter 21, an automatic gain control (ACG) circuit 23, an analog-to-digital (A/D) converter 22 and then a receiver 24, which includes an adaptive filter 25 followed by a decoder 26."[40] This arrangement is similar to modems in the prior art.

In addition, however, the modem of the '054 Patent (as shown by Figure 1) includes a line probing processor (58), which is illustrated on Figure 1 as a discrete component separate from the receiver (24). According to the disclosure of the '054 Patent, this "line probing processor 58 . . . measures the quality of channel A."[41] It is this line probing processor (58),

[39] In Figure 1, the local modem and the remote modem have substantially similar features, so only the remote modem need be discussed for an understanding of the disclosed invention.

[40] *Id.*, col. 4, ll. 39-43.

[41] *Id.*, col. 5, ll. 3-4.

along with its ability to measure line quality, that allows the modem of the '054 Patent to determine the best transmission band and bit rate, providing the alleged novelty of the '054 Patent.

Notably, the '054 Patent depicts the receiver (24) and line probing processor (58) as separate hardware components. In particular, the '054 Patent provides no illustration or description of the line probing processor (58) as being a component of the receiver (24). Nor does the '054 Patent provide any disclosure whatsoever that would allow the reader to infer that either the receiver (24) or the line probing processor (58) might be software components that could be executed on a general-purpose processor (such as a digital signal processor, or a computer's general processing unit).

It is also worth noting that neither Figure 1 nor any other figure in the '054 Patent depicts any structure labeled "selector." In fact, the specification of the '054 Patent includes no mention of a "selector," other than in the claims and in the "summary of the invention," which, as noted above, merely parrots the claims. Nothing in the summary section (or any other section of the '054 patent) provides any disclosure that would enable the reader to ascertain what constitutes the "selector" within the meaning of the claims.

C. The Claims of the '054 Patent.

The '054 Patent issued with 71 claims. GE has asserted only Claims 1, 12 and 46 in this action. Claims 1, 12 and 46 are each independent claims, and they recite generally similar elements.

A review of the asserted claims reveals that each recites three basic elements: (a) a receiver, (b) a line probing processor (or line probe processor, in the case of Claim 12), and (c) a

selector. The "line probing processor" (or "line probe processor") element in each claim is substantially identical.

The "receiver" element varies slightly among the asserted claims. Claim 1 recites that the receiver is "capable of receiving the modulated signal over any one of a plurality of frequency bands, said line probing signal simultaneously stimulating more than one of said plurality of frequency bands." Claim 12 is similar, but it further specifies that "each one of said plurality of frequency bands being characterized by a corresponding baud rate and carrier frequency." Claim 46 differs slightly, reciting that the receiver is "capable of receiving the modulated signal at any one of a plurality of bit rates." Similarly, the "selector" element varies slightly among the asserted claims, corresponding generally to the differences in the "receiver" element in each claim.

D. The Prosecution History of the '054 Patent.

As noted above, the '199 Application was filed on May 12, 1989. The '199 Application included sixty-two claims.[42] On July 31, 1990, the U.S. Patent and Trademark Office ("USPTO") mailed a first Office Action that rejected all pending claims under 35 U.S.C. § 112, ¶ 1 as lacking enablement. The Office Action also rejected several claims, including in pertinent part of Claims 1 and 37 (now Claim 46), under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,309, 773 to Johnson *et al.*

The applicant appears to have overcome the § 112, ¶ 1 rejection by virtue of an interview held on August 15, 1990. The applicant then filed a Response on October 31, 1990. In that

[42] As filed, Claim 1 of the '199 Application corresponds to Claim 1 of the '054 Patent, while Claim 37 of the '199 Application corresponds to Claim 46 of the '054 Patent. Claim 12 of the '054 Patent does not correspond to any claim in the '199 application; that claim was added later by amendment.

Response, the applicant amended several claims, including in pertinent part, amendment of Claim 1 to recite "said line probing signal simultaneously stimulating more than one of said plurality of frequency bands." The Response also added several claims, including Claim 63 (which corresponds to asserted Claim 12 in the '054 Patent).

In response to these amendments, the USPTO mailed a Notice of Allowability on January 29, 1991, and the '054 Patent subsequently issued on September 10, 1991.

IV. AGERE'S PROPOSED CONSTRUCTION OF CLAIM TERMS - '054 PATENT

A. "Receiver"

Proposed Construction: **"A hardware device for accepting signals from a remote device."** The term "receiver" is used in Claims 1, 12, and 46. The intrinsic evidence of record in this case provides no specific definition of a receiver, leaving the reader to infer from the '054 Patent's specification what the patentee meant by this term. What is clear from the disclosure of the '054 Patent is that the receiver receives (or accepts) a signal sent from a remote device. Specifically, the '054 Patent discloses that -- after passing through a lowpass filter, an ACG circuit and an A/D converter -- the signal received from the remote device (*e.g.,* another modem) "passes through . . . a receiver 24, which includes an adaptive filter 25 followed by a decoder 26."[43] The '054 Patent elaborates that the "[a]daptive filter 25 provides a desired overall impulse response for decoder 26 which decodes the received signal according to the particular coding scheme used by local modem 2 [*i.e.,* the remote device] to obtain an estimate of the

[43] '054 Patent, col. 4, ll. 39-43.

transmitted data bit stream 8."[44] Irrespective of the nature of this decoding, the reader must infer from the disclosure of the '054 Patent that the receiver accepts signals from a remote device.

The reader also must infer from the specification of the '054 Patent that the receiver is a hardware device. Figure 1, which is reprinted above, shows a hardware arrangement, and the specification of the '054 Patent consistently refers to the components illustrated on Figure 1 as hardware devices. The '054 Patent nowhere teaches or even suggests that any of the components on Figure 1 might be implemented as software components running on a digital signal processor (or other general-purpose processor).[45] Accordingly, the term "receiver" as used in Claims 1, 12, and 46 should be construed to mean a hardware device for accepting signals from a remote device.

B. "Line probing processor"

Proposed Construction: **"A hardware component that processes a line probing signal."** The term "line probing processor" is also used in Claims 1, 12, and 46.[46] Although much of the specification of the '054 Patent focuses on the detailed operation of the line probing

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[44] *Id.*, col. 4, ll. 43-47.

[45] The treatment by the '054 Patent of the devices shown in Figure 1, including in particular the receiver and the line probing processor, as discrete hardware devices is highlighted by contrast to the disclosure of the '758 Patent, which specifically states: "The present invention may be implemented in a digital communication system . . . where a digital signal processor (902) is utilized . . . . The processor typically includes a program storage medium (904) having a computer program to be executed by the digital signal processor . . . ." '758 Patent, col. 10, ll. 38-46. The absence of any such disclosure in the '054 Patent, especially considering that the '054 Patent and the '758 Patent both name Vedat Eyuboglu as an inventor, supports the conclusion that the '054 Patent, in contrast to the '758 Patent, provides no enabling disclosure of any software-based components, and that the components recited in the claims of the '054 Patent, therefore, must be hardware components.

[46] Claim 12 actually uses the term "line probe processor," but Agere's position is that the terms "line probe processor" and "line probing processor" are, for claim construction purposes, identical.

processor, the '054 Patent generally describes the operation of the line probing processor in this way: "In general, local modem 2 sends its probing signal sequence $x_1(n)$ to line probing processor 58 of the remote modem 4, which uses the corresponding received signal sequence to compute the signal-to-noise ratio (SNR) for channel A as a function of frequency . . . ."[47] In other words, the line probing processor processes a line probing signal.

While none of the intrinsic evidence provides any indication of the actual structure of the line probing processor, a fair reading of the specification of the '054 Patent requires the inference that the line probing processor is a hardware device separate from the receiver. As noted above, nothing in the '054 Patent provides any support for an interpretation of any component of Figure 1 (including, in particular, the line probing processor) as a software module of some sort. Indeed, the term "processor" itself connotes a microprocessor device.

Moreover, it is clear from Figure 1 that the line probing processor is a discrete device, which is separate from the receiver. The format of Claims 1, 12, and 46, which each recite the receiver and line probing processor as being two separate elements, neither incorporated within the other, supports the view that the line probing processor cannot be interpreted to be merely a portion of the receiver. Accordingly, the term "line probing processor" must be interpreted to mean a hardware device, separate from the receiver, that processes a line probing signal.

C. "Selector"

Agere's position is that the term "selector" cannot be construed based on the intrinsic evidence of record. More specifically, as used in Claims 1, 12 and 46 of the '054 Patent, the term "selector" renders those claims indefinite under 35 U.S.C. § 112, ¶ 2, because the claims

[47] '054 Patent, col. 5, ll. 5-9.

fail to particularly point out and distinctly claim the subject matter the applicant regards as his invention; this term also renders these claims invalid for failing to meet the enablement requirement of 35 U.S.C. § 112, ¶ 1, because the '054 Patent nowhere provides any enabling disclosure of a "selector." Agere will be filing, in due course, a Motion for Summary Judgment of Invalidity Under 35 U.S.C. § 112 to address the deficiencies of Claims 1, 12, and 46 in this regard.[48]

D. "For selecting one of the plurality of frequency bands"

Proposed Construction: **"For determining a frequency band to be used for receiving a modulated signal from the remote device, based upon the channel characteristics measured by the line probing processor."** This claim term is used in Claims 1 and 12. In Claim 1, the term is part of a limitation that recites, "a selector for selecting one of the plurality of frequency bands, said selection being based upon the measured characteristics of the channel, said selected frequency band to be used for receiving the modulated signal from the remote device." In Claim 12, the term is part of a limitation that recites, "a selector for selecting one of the plurality of frequency bands, said selection being based upon the measured characteristics of the channel, the modulated signal from the remote device being received at the corresponding baud rate associated with said selected frequency band." Because each of these limitations is somewhat convoluted, Agere seeks a construction that clarifies the meaning of these limitations.

In particular, the term "measured characteristics of the channel" is somewhat ambiguous. That term, however, finds antecedent basis in the earlier limitation "a line probing processor for

[48] While mindful of the Court's admonition that summary judgment motions should not be filed prior to the close of expert discovery, Agere is prepared to brief the issue of the invalidity of Claims 1, 12 and 46 under 35 U.S.C. § 112, if the Court would prefer to hear that issue at this stage of the proceedings.

measuring characteristics of the channel based upon the received line probing signal." Hence, a proper construction of the term "for selecting one of the plurality of frequency bands," when read in conjunction with the remainder of the limitation and the claim itself, must mean "for selecting one of the plurality of frequency bands, based upon the channel characteristics measured by the line probing processor," because there is no antecedent basis within either Claim 1 or Claim 12 for any "measured channel characteristics" other than those measured by the line probing processor.

Moreover, while Claim 12 does not explicitly state that the selected frequency band is "to be used for receiving the modulated signal from the remote device," the term "for selecting one of the plurality of frequency bands," Claim 1 does require this, and the claim term should be given the same meaning in both Claim 1 and Claim 12. Hence, in both Claim 1 and Claim 12, the term "for selecting one of the plurality of frequency bands" should be construed to mean "for determining a frequency band to be used for receiving a modulated signal from the remote device, based upon the channel characteristics measured by the line probing processor."

E. "For selecting one of the plurality of bit rates"

Proposed Construction: **"For determining a bit rate to be used for receiving a modulated signal from the remote device, based upon the channel characteristics measured by the line probing processor."** This term, which is used in Claim 46, is similar to the term "for selecting one of the plurality of frequency bands" used in Claims 1 and 12, except that it refers to bit rates instead of frequency bands. Similarly to the corresponding limitation in Claims 1 and 12, the limitation of Claim 46 reads: "a selector for selecting one of the plurality of bit rates, said selection being based upon the measured characteristics of the receiver channel, the selected bit rate to be used for receiving the modulated signal from the remote device." Once

again, the only antecedent basis for the term "measured characteristics of the receiver channel" is the "line probing processor for measuring characteristics of the channel based upon the received line probing signal." Hence, the term "for selecting one of the plurality of bit rates" should be construed to mean "for determining a bit rate to be used for receiving a modulated signal from the remote device, based upon the channel characteristics measured by the line probing processor."

V. THE INTRINSIC EVIDENCE RELEVANT TO INTERPRETATION OF THE '641 PATENT

A. The patent applications underlying the '641 Patent.

The '641 Patent issued on June 27, 1995 to Guozhu Long. As shown on the face of the patent, the '641 Patent stems from U.S. Patent Application No. 08/097,343 (the "'343 Application), which was filed on July 23, 1993. The '641 Patent does not claim priority from any earlier-filed applications.

B. The Specification of the '641 Patent.

The title of the '641 Patent is "Device and Method for Utilizing Zero-Padding Constellation Switching with Frame Mapping." The abstract on the cover page of the '641 Patent provides the following summary of the purported invention:

> A device (500) and method (400) for zero-padding constellation switching with frame mapping provides reduced complexity for mapping frames having possibly a fractional number of bits and a predetermined number of symbols while eliminating the usual disadvantages of constellation switching.[49]

The specification of the '641 Patent consists of five drawings and approximately ten columns of text. The specification concludes with eight claims. The first section of the

[49] '641 Patent, Abs.

specification is entitled "Field of the Invention" and simply states that the "present invention relates generally to digital communication devices and methods, and more particularly to mapping a digital data sequence for transmission in a digital communication system."[50]

The next section of the specification is entitled "Background." In this section, the applicant discusses how the invention addresses the problem of sending a fractional number of bits per frame for frames of a set number of symbols without switching constellations.[51] According to the applicant, the two problems associates with switching constellations are "introduction of a variation in constellation size and an increase in peak-to-average power ratio."[52] Thus, the purported novelty of the '641 Patent is allowing transmission of a fractional number of bits per frame without the reportedly disadvantageous effects of constellation switching.

The next section of the specification is entitled "Brief Description of the Drawings." There are five figures described shown. Figure 5 is significant to the issue of claim construction.

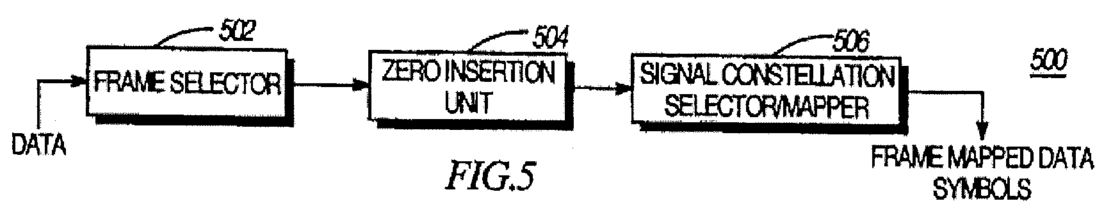

Figure 5 – U.S. Patent No. 5,248,641

Figure 5 illustrates the hardware components of the '641 Patent. The computer provides data for the frame selector (502). The frame selector the passes the data, in frames of data bits, to the zero insertion unit (504). The zero insertion unit adds a zero to frames with fewer bits, as

[50] *Id.*, col. 1, ll. 7-10.

[51] *Id.*, col. 1, ll. 40-44, col. 2, ll. 22-25.

discussed in more detail below. After inserting a zero, the signal constellation selector/mapper (506) maps the frames of data bits to signal points in a multi-dimensional constellation. The modem then transmits the frame mapped signals over the telephone line to a remote modem.

Notably, neither Figure 5 nor any other figure in the '641 Patent, nor, for that matter, any of the description in the '641 Patent, indicates that the components labeled "frame selector," "zero insertion unit," and "signal constellation selector/mapper" might be combinable into a single device or implemented as software running on a common device.

The final section of the specification is entitled "Detailed Description of the Preferred Embodiment." In this section, the applicant describes use of the purported invention to send fractional bits per frame within the known method of shell mapping, allegedly without constellation switching. More details of this section are discussed with respect to claim construction below.

C. The Claims of the '641 Patent.

The '641 Patent includes eight claims. GE is has asserted only Claims 1, 3, 5 and 7 against Agere.

D. The Prosecution History of the '641 Patent.

As noted above, the '343 Application was filed on July 23, 1993. The '343 application was filed with four claims. In an Office Action dated June 1, 1994, the USPTO rejected all four claims. More specifically, the USPTO objected to the specification under 35 U.S.C. § 112, ¶ 1 for failing to provide an enabling disclosure of the invention and rejected all four claims on the same ground. The Office Action also rejected all four claims of the application under 35 U.S.C.

Footnote continued from previous page

[52] *Id.*, col. 1, ll. 54-56.

§ 112, ¶ 2 as being indefinite for failing to distinctly claim the subject matter that applicant regarded as the invention. In an Amendment and Response filed November 1, 1994, the applicant revised the specification, amended the four existing claims, and added four new claims to the patent. On January 26, 1995, counsel for the applicant apparently held a telephone interview with the Examiner, and in a Supplementary Amendment filed February 1, 1995, the applicant revised the four new claims based on that telephone interview. The USPTO subsequently issued a Notice of Allowability on February 3, 1995, and the '641 Patent issued on June 27, 1995.

VI. AGERE'S PROPOSED CONSTRUCTION OF CLAIM TERMS - '641 PATENT

A. "Constellation"

Proposed Construction: **"The set of 2^n multi-dimensional signal points used to represent a mapping frame of n input data bits"**

As used in the claims of the '641 Patent, "constellation" is a term of art unique to modem signal processing and modems, which is further refined by the inventor's usage of the term. A general definition of the term constellation is implied in the "Background" section of the '641 Patent where it states: "For example, in quadrature amplitude modulation (QAM), [t]he line signal states can be represented by a set of complex numbers, namely by a set of points in a *two-dimensional signal constellation*."[53] In this usage, the term "line state" refers to the voltage and phase sent over a telephone line, and the combination of the two represent a signal point, which in turn represents a set of data bits. Thus, as implied in the Background section, a constellation is a set of two-dimensional points that represent line states. As the specification

[53] *Id.*, col. 1, ll. 28-31 (emphasis added).

continues, however, a different and more specific definition of the term "constellation" becomes apparent.

The inventor expands his use of the term "constellation" to include multiple dimensional signal points for a mapping frames of data bits. This expansion of the definition occurs in the inventor's discussion of the invention in the context of the prior art technique of frame mapping.[54] In frame mapping, whole frames of data bits are mapped to constellation signal points. Thus, a frame of J data bits can be mapped to "a signal constellation [that] has at least 2^J possible *signal combinations* per N symbols [in the mapping frame]."[55] These signal combinations are comprised of multiple two-dimensional symbols. Each signal combination is then mapped to a constellation so that the constellation is comprised of multi-dimension signal points.

With respect to the number of possible signal points used to represent a frame of data bits, the number of signal points necessary to represent n bits is 2^n, as stated in Agere's proposed definition. As the inventor states, "[t]he first step 402 is selecting a number of bits per frame to be one of : J-1, J, where J is an integer…"[56] "The values for J-1 and J represent first and second frame sizes, *i.e.*, number of bits per frame, for incoming data."[57] Thus, the frame size n, in Agere's proposed construction, is equal to J or J-1 as used in the specification to denote mapping frames of two different lengths. When a frame being mapped contains J bits, the constellation

[54] *Id.*, col. 2, ll. 63-65.

[55] *Id.*, col. 4, ll. 31-32.

[56] *Id.*, col. 7, ll. 8-9.

[57] *Id.*, col. 4. ll. 27-29.

contains 2^J signal points.[58] Alternatively, in frames with J-1 bits, a zero is inserted in the most significant bit position.[59] When a zero is in the most significant bit position, *i.e.*, for frames with J-1 bits, the number of signal points that may be used from the constellation is 2^{J-1}.[60] Thus, when a mapping frame contains J bits, the signal constellation contains 2^J signal points, but when a frame contains J-1 bits, the signal constellation contains 2^{J-1} signal points. Accordingly, Agere's construction is accurate, but instead of denoting frame size (number of bits) with J or J-1 and constellation size (number to signal points) with 2^J or 2^{J-1}, Agere has simplified by replacing the J or J-1 as the number of bits in a mapping frame with the variable n.

B. "Constellation Switching"

Proposed Construction: **"Using constellations with varying numbers of points for mapping multiple frames of data bits"**

Based on the plain meaning of the term "switching," Agere's proposed construction reflects the inventor's concern that when a constellation of a different size is used, then a device has switched constellations or performed "constellation switching." The inventor's definition of the term "constellation switching" is apparent in the Background section when the inventor discusses the disadvantages of "constellation switching": "The main disadvantages of constellation switching are the introduction of a variation in constellation size and an increase in peak-to-average power ratio due to the increase in constellation size."[61] Thus, according the specification, a change in constellation size (*i.e.*, an increase in the number of points in the

[58] *See id.* col. 4, ll. 31-33, col. 7, ll. 13-15.

[59] *See id.*, col. 4, ll. 33-38, col. 7, ll. 12-15.

[60] *See id.*, col. 4, ll. 35-38, col. 7, ll. 15-19.

[61] *Id.*, col. 1, ll. 54-57.

constellation) constitutes "constellation switching" and it leads to practical drawbacks in modem implementation. Agere's proposed construction as set forth above reflects the intent of the claimed invention.

C. "Can Be"

Proposed Construction: **"are or must be"** As used in the preamble, this term creates a required or limiting condition for the claim.

The preamble of Claims 1 and 3 of the '641 Patent states "a fractional number Q bits per frame can be transmitted without constellation switching."[62] The issue is whether the preamble of the claims and, more specifically, the phrase "can be" as used in the preamble provides a limiting condition to Claims 1 and 3 of the '641 Patent. Stated differently, the issue is whether the preamble limits Claims 1 and 3 of the '641 Patent such that they must not include constellation switching.

In determining whether to limit claims based upon language in the preamble, the Federal Circuit has stated that the review must be "resolved only on review of the entire[]...patent to gain an understanding of what the inventors actually invented and intended to encompass by the claim."[63] Furthermore, when the preamble recites "additional structure or steps underscored as important by the specification, the preamble may operate as a claim limitation."[64]

In the '641 Patent, the applicant considered the value of his invention to be its ability to forego constellation switching. In fact, the applicant distinguished his purported invention from

[62] *Id.*, col. 8, ll. 30-31, 63-64.

[63] *Catalina Marketing Int'l Inc. v. Coolsavings.com Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quoting *Corning Glass Works v. Sumitomo Electric U.S.A., Inc.*, 868 F.2d 1251, 1257 (Fed.Cir.1989)).

[64] *Id.*

the prior art based on this feature. Accordingly, this feature should be considered as limiting the claims of that patent. For example, in the Background section of the patent, the inventor distinguishes his invention from prior art techniques that involve constellation switching.[65] The inventor then highlights the disadvantages of techniques that employ constellation switching.[66] Finally, in the final statement in the background section, the inventor states: "Hence there is a need for a frame-mapping device and method which maps data that is transmitted as fractional bits per frame rate *such that the implementation difficulties of constellation switching are avoided*."[67] Thus, the inventor envisioned his invention as an improvement over prior art techniques that utilize constellation switching and accordingly, his invention does not include constellation switching.

The inventor's continued statements that his claimed invention avoids the need for constellation switching provide strong evidence that the inventor did not envision his invention as involving constellation switching. In fact, a reading of the specification affirms that the ability to avoid constellation switching is central to the invention. "The present invention provides an advantage for mapping frames of data which would otherwise require constellation switching . . . . . This scheme is particularly advantageous in that it eliminates the necessity for constellation switching . . . ."[68]

Throughout the '641 Patent, the inventor clearly attempts to avoid prior art that involves constellation switching techniques. For instance, the inventor states that "[c]onventional, [sic]

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[65] '641 Patent, col. 1, ll. 44-53.

[66] *Id.*, col. 1, ll. 54-62.

[67] *Id.*, col. 2, ll. 22-25.

[68] *Id.*, col. 2, ll. 44-46, 51-52.

this requires a constellation switching among frames. Using the scheme of the present invention, such a constellation switching can be avoided."[69] Thus, the inventor was aware of techniques that accomplish the goal of his invention, however, he viewed his invention to be an improvement on these techniques, since it does not require switching constellations. Accordingly, when the preamble of the claims state that "a fractional number Q bits per frame can be transmitted without constellation switching,"[70] the phrase should be construed as a limitation such that the claims require the technique be performed such that no constellation switching occurs. Thus, the term "can be" in Claims 1 and 2 of the '641 Patent must be read to limit the claims to the technique without constellation switching. Stated differently, the term "can be" should be construed as "must be" and as a limiting condition of the claims.

D. "Frame Selector", "Zero Insertion Unit", and "Signal Constellation Selector/Mapper"

Proposed Constructions:

Frame Selector - "a hardware device for selecting a number of data bits to fill a frame." Frame selector does not include devices storing or executing software such as a central processing unit ("CPU") or a digital signal processor ("DSP").

Zero Insertion Unit - "a hardware device for adding a zero to a frame of data bits." Zero insertion units do not include devices storing or executing software such as a CPU or DSP.

Signal Constellation Selector/Mapper - "a hardware device for selecting a constellation and mapping frames of data bits to signal points or symbols in such constellation." Signal

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[69] *Id.*, col. 4, ll.23-26.

[70] *Id.* at col. 8, ll. 31-32, 63-64.

constellation selector/mapper does not include devices storing or executing software such as a CPU or DSP.

The plain meaning of these terms imply hardware devices. The term "selector" as used in the claim terms "frame selector" and "signal constellation selector/mapper" implies a physical device that makes a selection; nothing in the patent implies that this could be implemented through software. Similarly, the term "mapper" implies a physical device that maps something. Lastly, the term "unit" as used in the claim term "zero insertion unit" implies a physical device.

The Specification also supports such a construction. For example, Figure 5 of the '641 Patent shows components labeled with the terms "frame selector," "zero insertion unit," and "signal constellation selector/mapper." Nothing in the '641 Patent provides any indication that these components might be anything other than what they appear to be: discrete hardware device that perform a specific function indicated by the title of each component, and pass the resulting signal to the next component in the diagram. When referring to Figure 5, the inventor states "FIG. 5, numeral 500, is a block diagram of a frame mapping *device*."[71] Thus, the inventor has depicted the invention as several physical components linked together or "operably coupled" (as discussed below), to form a complete physical device that accomplishes the purpose of the invention.

Moreover, similar to the '054 Patent discussed above, the '641 Patent contains no disclosure that might support an interpretation of any of the disclosed components as being merely software components, rather than discrete hardware devices. Accordingly, the terms

[71] *Id.* at col. 7, ll. 63-65 (emphasis added).

"frame selector," "zero insertion unit," and "signal constellation selector/mapper" should be interpreted to mean hardware components.

E. "Operably Coupled"

Proposed Construction: **"physically connected to allow inter-operation"**

The inventor uses the term "operably coupled" in Claims 3 and 7 of the patent to describe the connection between the zero insertion unit and the frame selector, and to describe the connection between the signal constellation selector/mapper and the zero insertion unit.[72] The only other use of these terms within the patent is to describe the same connections in Figure 5 of the specification.[73] Figure 5 shows a block of hardware components[74] that are "operably coupled." Because the components of Figure 5 are discrete hardware items, the only form of coupling between them must be physical connection that allows them to function together, or as stated in Agere's proposed construction, they are "physically connected to allow interoperation."[75]

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[72] *Id.*, col. 9, ll. 4-8, col. 10, ll. 19-27.

[73] *Id.*, col. 8, ll. 7-17.

[74] Under Agere's proposed claim constructions, the "frame selector", "zero insertion unit", and "signal constellation selector/mapper" are all hardware components. See construction of those terms in Sections VII. D., E., and F hereof.

[75] Agere's construction also is supported by the plain meaning of the terms within the field of art of the application of the '641 Patent. The Wiley Electrical and Electronic Engineering Dictionary defines the term "couple" as "1. To join, link, or allow the transfer of energy. For instance, to join circuits. 2. That which has been joined, linked, or connected in a manner which allows the transfer of energy. For example, coupled circuits." Thus, the definition of the term "coupled" as used in art specifies a connection for transfer of energy such as that between two circuits. This is consistent with the meaning provided by patent itself. A copy of the definition of the term "couple" from the *Wiley Electrical and Electronics Engineering Dictionary* is included in Exhibit B.

VII. THE INTRINSIC EVIDENCE RELEVANT TO INTERPRETATION OF THE '776 PATENT

A. The patent applications underlying the '776 Patent.

The '776 patent issued on March 6, 2001, to M. Vedat Eyuboglu, Pierre A. Humblet, and Dae-young Kim. The '776 Patent is based on U.S. Patent Application No. 08/999,249 (the "'249 Application), filed on December 29, 1997. The '776 Patent purports to be a continuation-in-part of an earlier-filed application, U.S. Patent Application No. 08/747,840, which was filed on November 13, 1996 and issued as U.S. Patent No. 5,818,879.[76]

B. The Specification of the '776 Patent.

The title of the '776 Patent is "Device and Method for Precoding Data Signals for PCM Transmission." The abstract on the cover page of the '776 Patent summarizes the purported invention as follows:

> A device and method for preceding [sic] data signals for pulse code modulation (PCM) transmission includes a transmitter for transmitting as sequence of analog levels over an analog channel to a quantization device, wherein the analog channel modifies the transmitted analog levels, the transmitter comprising: a mapping device for mapping data bits to be transmitted to a sequence of equivalence classes, wherein each equivalence class contains one or more constellation points; and a constellation point selector interconnected to the mapping device which selects a constellation point in each equivalence class to represent the data bits to be transmitted and which transmits an analog level that produces the selected constellation point at an input to the quantization device.[77]

The specification of the '776 Patent consists of seventeen drawings and approximately eighteen columns of text. The specification concludes with thirty-one claims. The first section

[76] The face of the '776 Patent indicates that U.S. Patent Application No. 08/747,840 issued as 5,818,075; Agere believes this to be an error.

[77] '776 Patent, Abs.

of the invention is entitled "Related Applications" and states that the '776 application is a continuation in part of another application, as discussed above. The second section of the specification is entitled "Field of the Invention" and simply states that the "invention relates to a device and method for preceding [sic] data signals for pulse code modulation (PCM) transmission."[78]

The next section of the specification is entitled "Background of the Invention." In this section, the inventors briefly explain downstream PCM transmission and the technical difficulties with implementing the same methods in the reverse direction.[79] Thus, the patent is focused on facilitating transmission of PCM signals in the direction from an end user modem to the central telephone company office.[80] Throughout the '776 Patent, the inventors refer to transmission of signals from an end user's modem to the digital modem at the internet service provider ("ISP") as "upstream" transmission and, alternatively, transmission of signals in the opposite direction as "downstream" transmission.[81]

The next section of the specification is entitled "Brief Description of the Drawings." Each of the seventeen figures of the patent are described in this section. Figures significant to the issue of claim construction include FIG. 16 (a detailed block diagram depicting PCM transmission with the PCM modem communication system) and FIG. 17 (an equivalent discrete time block diagram of the block diagram of FIG. 16).

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[78] *Id.*, col. 1, ll. 12-14.

[79] *Id.*, col. 1, ln. 17 - col. 2, ln. 10.

[80] *Id.*, col. 2, ll. 6-10.

[81] *Id.*, Fig. 8.

The final section of the specification is entitled "Detailed Description of the Preferred Embodiment." In this section, the inventors describe downstream PCM transmission, set forth problem encountered when attempting to end PCM signals in an upstream direction, and lastly set forth an embodiment of the invention, which facilitates sending PCM signal in an upstream direction.

C. The Claims of the '776 Patent.

The '776 Patent includes thirty-one claims. GE has asserted only Claims 1, 9, and 30 against Agere.

D. The Prosecution History of the '776 Patent.

As noted above, the '249 application was filed on December 29, 1997 and purports to be a continuation-in-part of an application that later matured into U.S. Patent No. 5,818,879. The '249 application was filed with thirty-one claims. In a first Office Action mailed on October 29, 1998, the USPTO rejected all thirty-one claims. The Office Action rejected Claims 1-3, 9, 10, 30 and 31 under 35 U.S.C. § 102(e) as being anticipated by the US. Patent No. 5,659,579 to Herzberg. The Office Action also rejected all thirty-one claims under the judicial doctrine of obviousness-type double patenting over U.S. Patent No 5,818,879.

The applicants failed to respond to the first Office Action and, on June 8, 1999, the USPTO mailed a Notice of Abandonment. On June 8, 2000, the inventors filed a Petition to Revive an Unintentionally Abandoned Application Under 37 C.F.R. 1.137(B). With the Petition to Revive, the inventors filed a Terminal Disclaimer to overcome the double patenting rejection, along with an Amendment in response to the Office Action.

In the Amendment, the applicants amended the preamble of Claim 1 to include the language (a) "which defines an equivalence class at the input of a quantization device" and (b)

"the precoded sequence forming the input to the quantization device." The applicant further amended Claim 1 to recite "a precoder including a mapping device" and made other amendments to Claims 1, 9, 16, 23 and 30. On June 29, 2000, the USPTO granted the applicant's Petition to Revive, and on September 26, 2000, the USPTO mailed a Notice of Allowability. The '776 Patent issued on March 6, 2001.

VIII. AGERE'S PROPOSED CONSTRUCTION OF CLAIM TERMS - '776 PATENT

A. "Quantization Device"

Proposed Construction: **"a device that converts a signal with a continuum of amplitudes to a set of discrete values, including linear, A-law, μ-law or any other analog to digital conversion"**

In Claims 1, 9, and 30 of the '776 Patent, the inventor states that the signal is received by a "quantization device" from an analog channel.[82] Since analog signals, which are sent over analog channels, are not discrete in time, but rather a continuous waveform, *e.g.*, a continuous sine wave, these signals have a continuum of amplitudes as opposed to discrete time steps like a digital signal. Thus, the quantization device in '776 is receiving signals in the form of a continuum of amplitudes. This continuum of amplitudes is represented in Figure 16 of the specification by the signal r(t), which is a time signal or continuous signal that has not yet been converted to a digital signal.[83]

The "quantization device," as described within, the specification converts the analog signal to a set of discrete values. The specification explicitly explains this function of a

[82] '776 Patent, col. 13, ll. 61-65, col. 14, ll. 48-51, col. 17, ll. 5-9.

[83] *Id.*, col. 13, ll. 15-20.

quantization device in terms of two specific analog to digital conversions -- A-law or μ-law.[84] Therefore, the quantization device converts the analog signal with a continuum of amplitudes into a set of discrete values, as shown in the '776 Patent, that is, the A-law or μ-law digital conversion.

However, the inventors' use of the term "quantization device" is broader than simply A-law or μ-law conversion because otherwise the inventor would have chosen the term "A-law or μ-law analog to digital converter" as opposed to the term "quantization device." Instead, the inventors use the term "quantization device" to broaden the claims of the invention and incorporate the common usage of the term quantization device in this field of art.[85]

B. "Upstream PCM Data Transmission"

Proposed Construction: **"transmission of pulse code modulated data to a digital modem"**

In construing the meaning of the term "upstream PCM data transmission," Claim 30 is most instructive. Claim 30 reads: "In an Analog [sic] pulse code modulation (PCM) modem adapted for upstream PCM data transmission to a digital PCM modem...." The Claim itself defines the acronym PCM as "pulse code modulation." Therefore, the term "PCM data transmission" must mean transmission of pulse code modulated data. Claim 30 indicates that the data transmission is to a "digital PCM modem" or, more broadly stated, a "digital modem."

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[84] *Id.*, col. 13, ll. 15-20.

[85] The definition provided by intrinsic evidence is consistent with the definition one would find using extrinsic evidence. The Wiley Electrical and Electronic Engineering Dictionary defines the term "quantization" as "[t]he division of a quantity or phenomenon, such as a wave, with an infinitely variable range of values into one or more ranges with finites values, each called a quantized value. For example, the conversion of an analog input to a digital output." *Wiley Electrical and Electronics Engineering Dictionary*, at 619 (Steven M. Kaplan ed., John Wiley & Sons, Inc. 2004). A copy of the definition of the term "quantization" from the *Wiley Electrical and Electronics Engineering Dictionary* is included in Exhibit B.

Thus, the definition of the term upstream PCM data transmission clearly must be construed to mean "transmission of pulse code modulated data to a digital modem."

C. "Analog Pulse Code Modulation (PCM) Modem"

Proposed Construction: **"a modem that transmits pulse code modulated data over an analog line"**

Claim 30 of the '776 Patent itself provides the basis for construction of the term "analog pulse code modulation (PCM) modem." Claim 30 recites: "an Analog [sic] pulse code modulation (PCM) modem adapted for upstream PCM data transmission." Thus the "analog pulse code modulation (PCM) modem" must transmit pulse code modulated data, since it is "adapted for PCM data transmission."

The specification provides further guidance. The specification states "[i]n block diagram 110 there is included an analog PCM modem 112 interconnected to analog channel 113," thus because the modem is connected to an analog channel the "analog pulse code modulation (PCM) modem" must transmit over an analog line.[86] Furthermore, in Figures 16 and Figures 17, the analog modem is depicted as item 182 and 182' respectively.[87] In these figures, the modem is shown connected to an analog line. Thus, the "analog pulse code modulation (PCM) modem" must transmit pulse code modulated data over an analog line.

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[86] '776 Patent, col. 7, ll. 43-44.

[87] *Id.*, col. 13, l. 5, 36-37.

IX. CONCLUSION

Agere respectfully submits that the above proposed constructions for the limitations of the asserted claims of the '054 Patent, the '641 Patent, and the '776 Patent are supported by the intrinsic evidence and should be adopted by the Court as a matter of law.

Respectfully submitted,

YOUNG CONAWAY STARGATT & TAYLOR, LLP

Josy W. Ingersoll (No. 1088)
jingersoll@ycst.com
John W. Shaw (No. 3362)
jshaw@ycst.com
Jeffrey T. Castellano (No. 4837)
jcastellano@ycst.com
The Brandywine Building
1000 West Street, 17th Floor
Wilmington, DE 19899-0391
302-571-6600
Attorneys for Defendant Agere Systems Inc.

OF COUNSEL:

David E. Sipiora
Ian L. Saffer
Chad E. King
TOWNSEND AND TOWNSEND AND CREW, LLP
1200 17th Street, Suite 2700
Denver, CO 80202
303-571-4000

Dated: April 28, 2008

CERTIFICATE OF SERVICE

I, Jeffrey T. Castellano, Esquire, hereby certify that on April 28, 2008, I caused to be electronically filed a true and correct copy of the foregoing document with the Clerk of the Court using CM/ECF, which will send notification that such filing is available for viewing and downloading to the following counsel of record:

Richard L. Horwitz, Esquire
Philip A. Rovner, Esquire
David E. Moore, Esquire
Potter Anderson & Corroon LLP
1313 N. Market Street
Wilmington, DE 19801

I further certify that on April 28, 2008, I caused a copy of the foregoing document to be served by hand delivery on the above-listed counsel of record and on the following non-registered participants in the manner indicated:

BY E-MAIL

Joel E. Freed, Esquire
Brian E. Ferguson, Esquire
Mark A. Davis, Esquire
D. Sean Trainor
McDermott Will & Emery LLP
600 13th Street, N.W.
Washington, DC 20005
jfreed@mwe.com
bferguson@mwe.com
madavis@mwe.com
dtrainor@mwe.com

Edwin H. Wheeler, Esquire
McDermott Will & Emery LLP
3150 Porter Drive
Palo Alto, CA 94304
mwheeler@mwe.com

YOUNG CONAWAY STARGATT & TAYLOR, LLP

Josy W. Ingersoll (No. 1088)
jingersoll@ycst.com
John W. Shaw (No. 3362)
jshaw@ycst.com
Jeffrey T. Castellano (No. 4837)
jcastellano@ycst.com
The Brandywine Building
1000 West Street, 17th Floor
Wilmington, Delaware 19801
(302) 571-6600

Attorneys for Agere Systems Inc.

EXHIBIT A

Exhibit A – Claims Asserted by GE

U.S. Patent No. 5,048,054

1. A modem for receiving data sent from a remote device over a communication channel by using a single carrier modulated signal, the modem comprising:

   a. a receiver for receiving the modulated signal and for receiving a line probing signal sent by the remote device over the channel, the receiver being capable of receiving the modulated signal over any one of a plurality of frequency bands, said line probing signal simultaneously stimulating more than one of said plurality of frequency bands;

   b. a line probing processor for measuring characteristics of the channel based upon the received line probing signal; and

   c. a selector for selecting one of the plurality of frequency bands, said selection being based upon the measured characteristics of the channel, said selected frequency band to be used for receiving the modulated signal from the remote device.

12. A modem for receiving data sent from a remote device over a communication channel by using a single carrier modulated signal, the modem comprising:

   a. a receiver for receiving the modulated signal and for receiving a line probing signal sent by the remote device over the channel, the receiver being capable of receiving the modulated signal over any one of a plurality of frequency bands, each one of said plurality of frequency bands being characterized by a corresponding baud rate and carrier frequency;

   b. a line probe processor for measuring characteristics of the channel based upon the received line probing signal; and

   c. a selector for selecting one of the plurality of frequency bands, said selection being based upon the measured characteristics of the channel, the modulated signal from the remote device being received at the corresponding baud rate associated with said selected frequency band.

46. A modem for receiving data sent from a remote device over a communication channel by using a single carrier modulated signal, the modem comprising:

a. a receiver for receiving the modulated signal and for receiving a line probing signal sent by the remote device over the channel, the receiver being capable of receiving the modulated signal at any one of a plurality of bit rates;

b. a line probing processor for measuring characteristics of the channel based upon the received line probing signal; and

c. a selector for selecting one of the plurality of bit rates, said selection being based upon the measured characteristics of the receiver channel, the selected bit rate to be used for receiving the modulated signal from the remote device.

U.S. Patent No. 5,428,641

1. A frame-mapping method for mapping N-symbol frames of data, N a predetermined integer (N>1), such that a fractional number Q of bits per frame can be transmitted without constellation switching, comprising the steps of:

A) selecting a number of bits for each frame to be one of: J-1, J, where J is an integer such that $J-1<Q<J$, where $Q=N*B/S$, B is a predetermined bit rate and S is a predetermined symbol rate,

B) in frames of J-1 bits, inserting a zero in a most significant bit (MSB) position,

C) selecting a signal constellation with 2^J possible signal combinations per N symbols, and

D) mapping the frame bits such that for MSB=0, one of the 2^{J-1} N-point combinations with the least average energy is selected from the signal constellation.

3. A frame-mapping device for mapping N-symbol frames of data, N a predetermined integer (N>1), such that a fractional number of bits per frame can be transmitted without constellation switching, comprising:

A) a frame selector, operably coupled to receive the data, for selecting a number of bits for each frame to be one of: J-1, J, where J is an integer such that $J-1<Q\leq J$, where $Q=N*B/S$, B is a predetermined bit rate and S is a predetermined symbol rate,

B) a zero insertion unit, operably coupled to the frame selector, for, in frames of J-1 bits, inserting a zero in a most significant bit (MSB) position,

C) a signal constellation selector/mapper, operably connected to the zero insertion unit, for selecting a signal constellation with at least 2^J possible signal combinations per N symbols, and mapping the frame bits such that for MSB=0, one of the 2^{J-1} combinations of N points with the least average energy is selected from the signal constellation.

5. A frame-mapping method for mapping successive frames of data to groups of N symbols, N a predetermined integer (N>1), such that, on average, a fractional number Q of bits are mappable per frame without constellation switching, comprising the steps of:

A) selecting a number of bits for each frame to be one of: J-1, J, where J is an integer such that J-1<Q<J, according to a predetermined pattern,

B) in frames of J-1 bits, inserting a zero in a most significant bit (MSB) position.

C) selecting a set of 2^J possible combinations of N symbols, where each symbol is chosen from a signal constellation and

D) mapping the frame bits such that for MSB=0, one of the 2^{J-1} possible combinations of N symbols of least average energy is selected from the 2^J possible combinations.

7. A frame-mapping device for mapping successive frames of data to groups of N symbols, N a predetermined integer (N>1), such that, on average, a fractional number Q of bits are mappable per frame without constellation switching, comprising:

A) a frame selector, operably coupled to receive the data, for selecting a number of bits for each frame of data to be one of: J-1, J, where J is an integer such that J-1<Q<J, according to a predetermined pattern,

B) a zero insertion unit, operably coupled to the frame selector, for, in frames of J-1 bits, inserting a zero in a most significant bit (MSB) position,

C) a signal constellation selector/mapper, operably coupled to the zero insertion unit, for selecting a set of 2^J possible combinations of N symbols, where each symbol is chosen from a signal constellation, and mapping the frame bits such that for MSB=0, one of 2^{J-1} possible combinations of N symbols of least average energy is selected from the set of 2^J possible combinations.

U.S. Patent No. 5,446,758

1. A device for mapping an input digital data sequence into an output signal point sequence x(D) for transmission over a channel characterized by a nonideal channel response h(D) using a trellis code C comprising:

a mapper for mapping the digital data sequence into a signal point sequence u(D) such that the components u_k of u(D), where k is a time index, are selected based in part on past components $\{y_{k-1}, y_{k-2}, \ldots\}$ of a channel output sequence y(D)=x(D)h(D) which are obtained based on feedback information provided by a precoder,

a precoder for generating said output signal point sequence x(D) according to x(D)=u(D)+d(D), wherein d(D) represents a nonzero difference between a selected sequence c(D) and a postcursor intersymbol interference (ISI) sequence p(D) substantially of a form p(D)=x(D)[h(D)-1], wherein c(D)is selected such that the channel output sequence y(D) is a code sequence in said trellis code C.

26. A method for mapping an input digital data sequence into an output signal point sequence x(D) for transmission over a channel characterized by a nonideal channel response h(D) using a trellis code C comprising the steps of:

mapping the digital data sequence into a signal point sequence u(D) such that a component u_k of u(D) at a given time k is selected based in part on past components $\{y_{k-1}, y_{k-2}, \ldots\}$ of a channel output sequence y(D)=x(D)h(D) based on feedback information provided by a precoder,

generating, by the precoder, said signal point sequence x(D) according to x(D)=u(D)+d(D), wherein d(D) represents a nonzero difference between a selected non-zero sequence c(D) and a postcursor intersymbol interference (ISI) sequence p(D) substantially of a form p(D)=x(D)[h(D)-1], wherein c(D) is selected such that the channel output sequence y(D) is a code sequence in said trellis code C.

36. A digital signal processor having at least a plurality of registers and an arithmetic logic unit, for use in a digital communication system to precode a digital data sequence into a signal point sequence x(D) for transmission over a discrete-time channel with a impulse response h(D) using a trellis code C, the processor having a device comprising:

mapping means for mapping, using the plurality of registers and the arithmetic logic unit, the digital data sequence into a signal point sequence u(D) such that a component u_k of u(D) at a given time k is selected based in part on past components $\{y_{k-1}, y_{k-2}, \ldots\}$ of a channel output sequence y(D)=x(D)h(D) based on feedback information,

precoding means for generating, using the plurality of registers and the arithmetic logic unit, said signal point sequence x(D) according to x(D)=u(D)+d(D), wherein d(D) represents a nonzero difference between a selected non-zero sequence c(D) and a postcursor intersymbol interference (ISI) sequence p(D) substantially of a form p(D)=x(D)[h(D)-1], wherein c(D) is selected such that the channel output sequence y(D) is a code sequence in said trellis code C.

U.S. Patent No. 6,198,776

1. A transmitter which defines an equivalence class at the input of a quantization device for precoding a sequence of analog levels to be transmitted over an analog channel to said quantization device, the precoded sequence forming the input to the quantization device, comprising:

a precoder including a mapping device for mapping data bits to be transmitted to as a sequence of equivalent classes, wherein each equivalence class contains one or more constellation points; and a constellation point selector interconnected to the mapping device which selects a constellation point in each equivalence class to represent the data bits to be transmitted and which transmits a level that produces the selected constellation point to an input of the quantization device.

9. A method for providing a precoded sequence of analog levels over an analog channel to a quantization device, comprising:

mapping data bits to be transmitted to a sequence of equivalence classes, wherein each equivalence class contains one or more constellation points;

selecting a constellation point in each equivalence class to represent the data bits to be transmitted; and,

transmitting a level that produces the selected constellation point to an input of the quantization device.

30. In an analog pulse code modulation (PCM) modem adapted for upstream PCM data transmission to a digital PCM modem, a precoder for precoding a sequence of analog levels transmitted over an analog channel to a quantization device, comprising:

a mapping device for mapping data bits to be transmitted to a sequence of equivalence classes, wherein each equivalence class contains one or more constellation points; and,

a constellation point selector interconnected to the mapping device which selects a constellation point in each equivalence class to represent the data bits to be transmitted and which transmits an analog level that produces the selected constellation point at an input of the quantization device.

EXHIBIT B

WILEY ELECTRICAL AND ELECTRONICS ENGINEERING DICTIONARY

Steven M. Kaplan
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electrodes, and in which with each successive input pulse the conduction is transferred in sequence to the next output electrode. Also called **counting tube (2)**. When there are ten output electrodes it is called **decade counter tube (2)**. **3.** An electron tube which registers ionizing radiation, such as alpha rays, and produces an output electric pulse which can be counted. For example, a Geiger-Müller tube. Also called **radiation counter tube**.

counterclockwise In the opposite direction as the moving hands of a clock when viewed from the front. Its abbreviation is ccw.

counterclockwise-polarized wave An elliptically polarized transverse electromagnetic wave in which the rotation of the electric field vector is towards the left when viewed along the direction of propagation. Also called **left-hand polarized wave**.

counterelectromotive force Same as **counter emf**.

counterpoise One or more wires mounted close to the ground, but insulated from it, to form a low-impedance and high-capacitance path to said ground. This provides a radio-frequency ground for an antenna. Also called **antenna counterpoise**.

counting circuit Same as **counter (2)**.

counting tube **1.** Same as **counter tube (1)**. **2.** Same as **counter tube (2)**.

country code **1.** A code used for dialing a country other than that within which a telephone call is originated. Such a code is usually followed by a city code, and then the specific telephone number. Some regions require dialing the country code even when the call is originated in the same country. **2.** Over the Internet, a two-character abbreviation which identifies a country. It appears at the end of a Uniform Resource Locator, or address, as in: **xxxx@zzz.com.qq**, where the country code is **qq**. A given country code in an address does not necessarily mean that the host to that address is physically there. Also called **Internet country code**.

country-specific Pertaining to hardware or software that utilize conventions that incorporate the specific needs of a given country. For instance, a keyboard that has special characters.

couple **1.** To join, link, or allow the transfer of energy. For instance, to join circuits. **2.** That which has been joined, linked, or connected in a manner which allows the transfer of energy. For example, coupled circuits. **3.** To place two dissimilar metals in contact with each other. **4.** Two dissimilar metals which have been placed in contact with each other. For instance, a thermocouple.

coupled antennas Two or more antennas which are electromagnetically coupled to each other.

coupled circuits Two or more electric circuits which are coupled. Such coupling may be capacitive, inductive, conductive, and so on.

coupled oscillators Two or more oscillator circuits which are coupled. Such coupling may be, for instance, capacitive or inductive.

coupler **1.** A device or means which serves to join, link, or allow the transfer of energy. **2.** A device or means which allows coupling between circuits. Such coupling may be capacitive, inductive, conductive, and so on. **3.** A device or means which allows energy to be transferred between waveguides.

coupling **1.** Interaction resulting from joining, linking, or the transferring of energy. **2.** Interaction between circuits in which energy is transferred. The resulting coupling may be capacitive, inductive, conductive, optical, and so on. **3.** A device which serves to join, link, or allow the transfer of energy. For example, a waveguide coupling.

coupling aperture An opening which allows the transfer of energy into or out of a waveguide or cavity resonator. Also called **coupling hole**, or **coupling slot**.

coupling capacitor A capacitor which blocks DC and low-frequency AC, while allowing higher-frequency AC to pass freely. Also called **blocking capacitor**, or **isolation capacitor**.

coupling coefficient Also known as **coupling constant**, **coupling factor**, **coupling ratio**, or **coefficient of coupling**. **1.** A measure of the strength of interaction between two systems, such as particles. **2.** A numerical value which expresses the degree of coupling between two systems, especially circuits. This value is always greater than 0 and less than 1, or 0% and 100% respectively. A coefficient of coupling of 0 would represent no coupling, and 1 would be perfect coupling.

coupling constant Same as **coupling coefficient**.

coupling factor Same as **coupling coefficient**.

coupling hole Same as **coupling aperture**.

coupling loop A small loop of wire inserted into a waveguide or cavity resonator, which allows energy to be transferred in or out. Also called **loop (5)**.

coupling loss Loss occurring during capacitive, inductive, conductive, or optical coupling. Also called **coupling losses**.

coupling losses Same as **coupling loss**.

coupling network An electric network which allows energy to be transferred between circuits.

coupling probe A probe which is inserted into a waveguide or cavity resonator, which allows energy to be transferred in or out. Such a probe is usually a pin or a wire.

coupling ratio Same as **coupling coefficient**.

coupling slot Same as **coupling aperture**.

courseware Software supplementing, or comprising, any given material being learned. Used, for instance, in computer-aided instruction. Also called **educational software**.

courtesy copy Same as **carbon copy**.

covalent bond A chemical bond in which two atoms within a molecule share one or more pairs of electrons. Such a bond may be between atoms of the same element, as in O_2 (molecular oxygen), or between different elements, as in **GaAs** (gallium arsenide). Also called **electron-pair bond**.

coverage **1.** The geographical area within which a given transmitter provides effective service. For instance, the zone served by a cellular telephone system, the region within which reception of TV or radio broadcasts is adequate, or the zone a radar can effectively scan. Also called **coverage area**, or **service area**. **2.** The service provided within a **coverage area**.

coverage area Same as **coverage (1)**.

cp Symbol for **candlepower**.

cP Symbol for **centipoise**.

CPA Abbreviation of **Chirped Pulse Amplification**.

CPA laser Abbreviation of **Chirped Pulse Amplification laser**.

CPE **1.** Abbreviation of **customer premises equipment**. **2.** Abbreviation of **computer performance evaluation**.

CPGA Abbreviation of **ceramic pin grid array**.

cpi Abbreviation of **characters per inch**.

CPI Abbreviation of **characters per inch**.

CPM Abbreviation of **critical path method**.

cpm Abbreviation of **cycles per minute**.

cps **1.** Abbreviation of **characters per second**. **2.** Abbreviation of **cycles per second**.

and in what proportions. A **qualitative analysis** would only determine, for instance, the species present.

quantity Its abbreviation is **qty**. **1.** A number, amount, or value. **2.** A specified number, amount, or value. **3.** A large number, amount, or value. **4.** For a given component, circuit, device, system, material, or the like, a property which is measurable, countable, or can otherwise be expressed as a **quantity (1)**. **5.** An entity which has a value or magnitude, upon which mathematical operations may be performed.

quantization **1.** The division of a quantity or phenomenon, such as a wave, with an infinitely variable range of values into one or more ranges with finite values, each called a quantized value. For example, the conversion of an analog input into a digital output. Since the number of subranges created can not be infinite, there will always be a loss, however minor, of information, called quantization error. **2.** The division of a range of values into labeled subranges. For example, any number between 1 and 30 is **a**, between 31 and 60 is **b**, between 61 and 90 is **c**, and so on. **3.** The description of an interval of values as a discrete number possible values. For example, anything occurring between 12 AM day one and 12 AM day two, being recorded as occurring on day one, regardless of the hour. **4.** The process of applying quantum mechanics or quantum theory to something.

quantization distortion Distortion introduced in the process of **quantization (1)**. This distortion is due to the quantization error present. Also called **quantizing distortion**.

quantization error The information which is lost in the process of **quantization (1)**. This causes noise and distortion. Also called **quantizing error**.

quantization noise Noise introduced in the process of **quantization (1)**. This noise is due to the quantization error present. Also called **quantizing noise**.

quantize **1.** To perform the process of **quantization (1)**, or **quantization (2)**. **2.** To apply quantum mechanics or quantum theory to something.

quantized **1.** That which has undergone the process of **quantization (1)**, or **quantization (2)**. **2.** That which has had quantum mechanics or quantum theory applied to it.

quantized system A system in which only certain allowed energy values may be adopted. Electrons in such a system can only change from one specific level to another, and in the process absorb or emit energy.

quantized value One of the finite values derived from a quantity or phenomenon with an infinitely variable range of values, through the process of **quantization (1)**. Also called **quantum (2)**.

quantizer That which performs the process of **quantization (1)**, or **quantization (2)**. For example, a circuit or device serving as an analog-to-digital converter.

quantizing The process of **quantization (1)**, or **quantization (2)**.

quantizing distortion Same as **quantization distortion**.

quantizing error Same as **quantization error**.

quantizing noise Same as **quantization noise**.

quantum Its abbreviation is **Q**. Its plural form is **quanta**. **1.** For a given physical phenomenon, such as electromagnetic radiation, the smallest quantity, such as that of energy, that can exist independently. For such phenomena, any quantity above this can only exist in multiples of this unit. In the case of light, for, instance, energy can be absorbed or radiated only in multiples of these discrete packages called photons. **2.** A **quantum (1)** utilized as a unit. For example, the quantum of electromagnetic radiation is the photon, which is also called light quantum. **3.** Same as **quantized value**. **4.** Any given quantity which can be counted or measured.

quantum bit Same as **qubit**.

quantum chromodynamics The area of quantum theory dealing with the relationships between quarks, especially the strong interaction via gluons. Its abbreviation is **QCD**.

quantum computer A computer whose basic unit of computing is the **qubit**. A quantum computer operates on all qubits simultaneously, thus is exponentially faster than conventional computers based, for instance, on the charge of a capacitor in RAM or on the magnetization of macroscopic particles on a hard disk.

quantum computing The use of **quantum computers**.

quantum cryptography Cryptography which makes use of quantum mechanics to code information or create keys which are unbreakable. Used, for instance, in one-time pads. Also called **quantum encryption**.

quantum dot A semiconductor structure forming a three-dimensional **quantum well**. Used, for instance, in semiconductor lasers, and to study the behavior of the electrons of atoms so constrained.

quantum-dot laser A semiconductor laser utilizing a **quantum dot**. Such a laser is highly temperature insensitive, provides an extremely broad gain spectrum, and an exceedingly narrow line width.

quantum efficiency Also called **quantum yield**. **1.** The number of electrons released by a photoemissive surface, such as a photocathode, per photon of incident radiation. **2.** The number of photon-induced reactions, per incident photon. For instance, the ratio number of photons emitted by a surface, to the number of photons absorbed.

quantum electrodynamics The area of quantum theory dealing with electromagnetic interactions between elementary particles, such as electrons and muons, especially exchanges of photons. Its abbreviation is **QED**.

quantum electronics The application of quantum mechanics, especially the energy states of matter, to electronics. Applied, for instance, in masers.

quantum encryption Same as **quantum cryptography**.

quantum field theory The area of quantum theory that deals with the quantum-mechanical interactions between elementary particles and fields. An application is quantum electrodynamics. Its abbreviation is **QFT**.

quantum jump A transition or change in energy whose magnitude is a **quantum (2)**. For example, a change in the orbit of an electron in which a quantum is absorbed or emitted. Also called **quantum transition**.

quantum mechanics **1.** The science dealing with the application of quantum theory to the mechanics of elementary and atomic particles and systems. **2.** Same as **quantum theory**.

quantum number A number, with integer or half-integer values, which characterizes a property or state of a particle or system. For example the spin of an electron may be characterized by the quantum numbers +½, or −½.

quantum physics The branch of science which utilizes quantum theory to analyze, explain, and predict the physical properties of a system.

quantum state A state in which a particle or system can exist in, according to quantum theory. Such a state is described by quantum numbers.

quantum statistics The application of statistical methods to particles and systems that obey the rules of quantum mechanics. For instance, the distribution of energy levels of the particles of a given system.

quantum system A system which can only be accurately described through the use of quantum physics.

quantum theory The theory according to which energy is emitted or absorbed in discrete units called **quanta**. It describes the behavior of atomic and subatomic particles and systems. According to quantum theory, electromagnetic radiation has both particle-like properties, as seen in the pho-